Trucking Perspective: NACFE

Dave Schaller

December 2021

North American Council for Freight Efficiency

- Unbiased, non-profit
- Mission to double freight efficiency
- All stakeholders
- Scale available technologies, guide future change and Run on Less demonstrations.
- Primary focus: Tractor-trailers

www.NACFE.org

10 YEARS NACFE
NORTH AMERICAN COUNCIL FOR FREIGHT EFFICIENCY

Guidance on Electric Trucks

 # 1

Electric Trucks: Where They Make Sense

May 2018

MD Electric Trucks: Cost Of Ownership

October 2018

 # 2

Viable Class 7 & 8 Electric, Hybrid & Alt Fuels Tractors

 # 4

December 2019

 # 3

Electric Trucks: Charging Infrastructure

March 2019

High Potential Regions

 # 5

November 2020

Heavy-Duty Hydrogen Fuel Cell Tractors

 # 6

December 2020

Now Free Online at https://nacfe.org/emerging-technology/electric-trucks-2/

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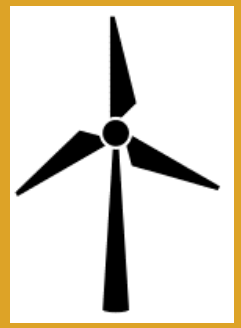
Getting to Know Each Other

FLEETS



Primer: UTILITIES on FLEETS

RMI
ENERGY. TRANSFORMED.

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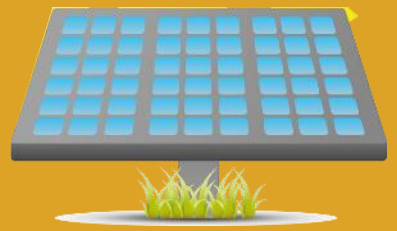
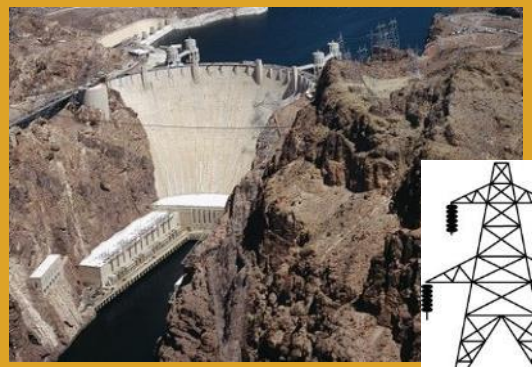
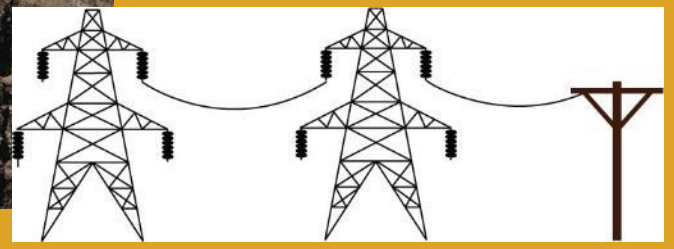
Primer: FLEETS on UTILITIES







UTILITIES

September 2021

Utilities & Truck Electrification

Challenges

- Difficult to forecast MD & HD Electrification (loads & locations)
- Most truck fleets don't currently warrant an account manager
- Just as utility companies vary widely in operations, so do truck fleets.
- As fleets electrify they may be dealing with multiple utilities.
- EV trucks are 3 times more expensive & don't have a proven ROI yet.

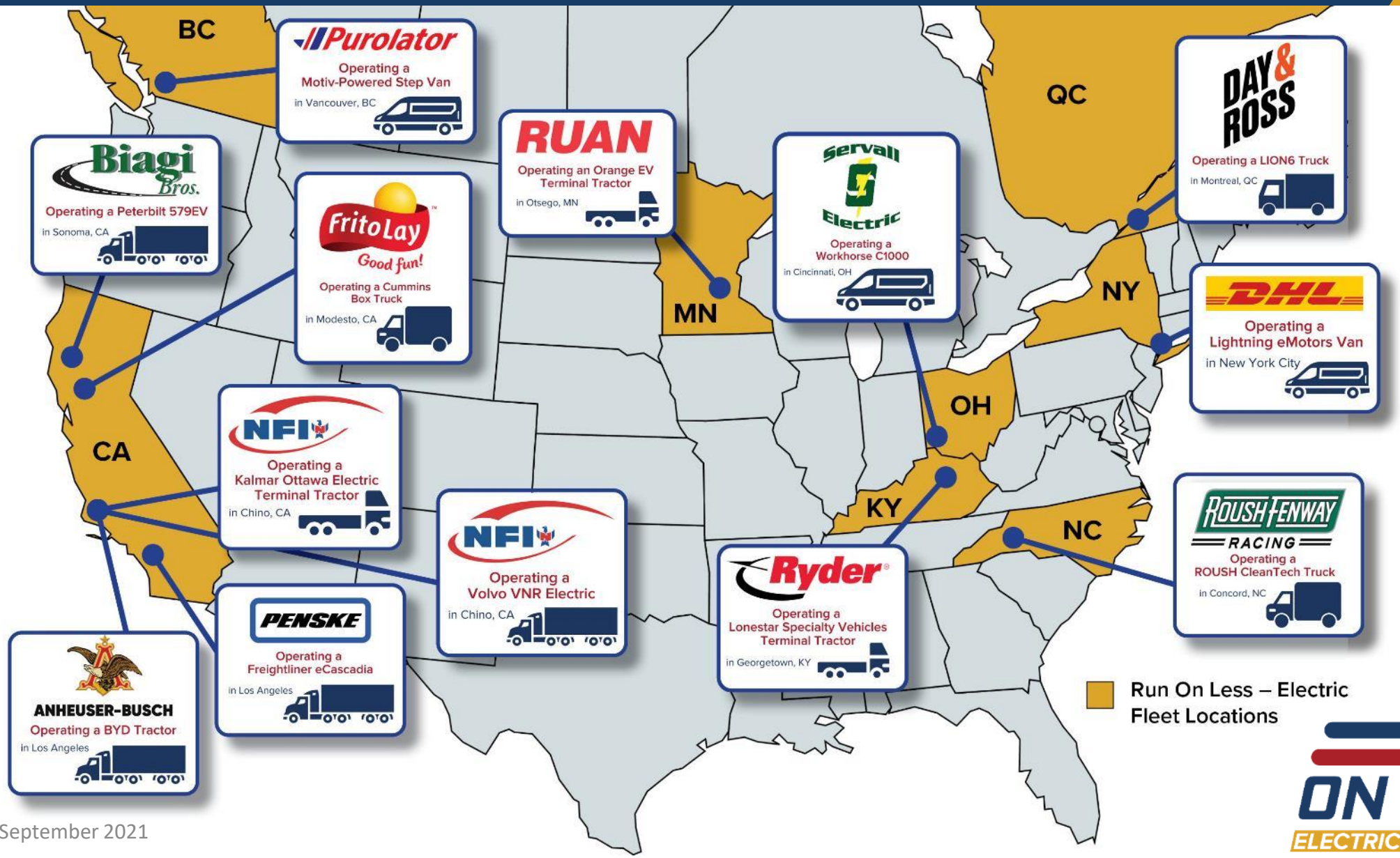
Opportunities

- Work with truck dealers (who themselves may need charging systems)
- Investigate the large industrial parks & distribution centers in your area
- Research ports including water, air and rail as potentials
- Join your state trucking association
- Help fleets with make ready funding & grants for infrastructure
- Trucking is a relationship business, so start one as soon as possible

Truck Electrification Case Studies

- Every two years NACFE conducts a benchmarking of industry leaders in trucking efficiency with real fleets carrying freight on their own terms: Run on Less (as in less diesel fuel).
- For 2021 the focus was on 13 different real world battery electric trucks.
- Each truck was equipped with telematics reporting back to NACFE so we could monitor actual operations on real freight routes.

Run on Less – Electric Participants



RUN ON LESS ELECTRIC

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FREIGHTLINER

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ROUSH CLEANTECH

AMPLY POWER

EDF ENVIRONMENTAL DEFENSE FUND Finding the ways that work

Supporting Sponsors

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NORTH AMERICAN COMMERCIAL VEHICLE SHOW

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MERLIN SOLAR

HORTON

Breakthrough

Electrification Coalition

WOMEN IN TRUCKING

RUN ON LESS ELECTRIC

Vans and Step Vans

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MD Box Trucks

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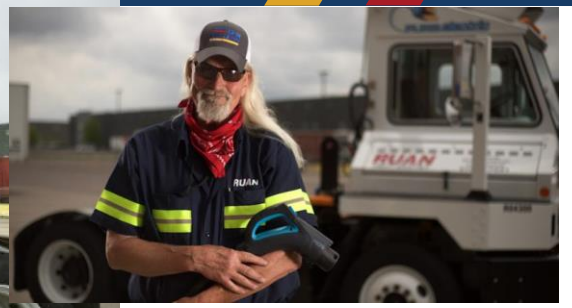
Terminal Tractors



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Regional Haul (Mostly)

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Short Regional Haul

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Run on Less – Electric Videos

Real World, Real Time Case Studies

- Video for each fleet & OEM
- Fleet Interviews: Drivers & Leaders
- OEM Interviews & more

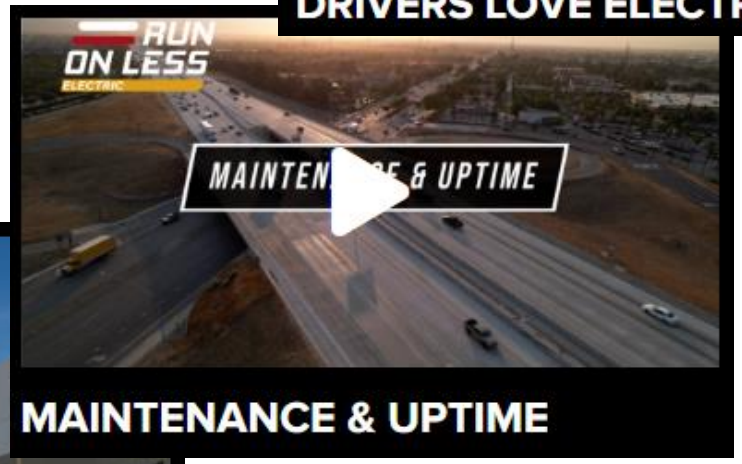
September 2021

Run on Less – Electric Videos

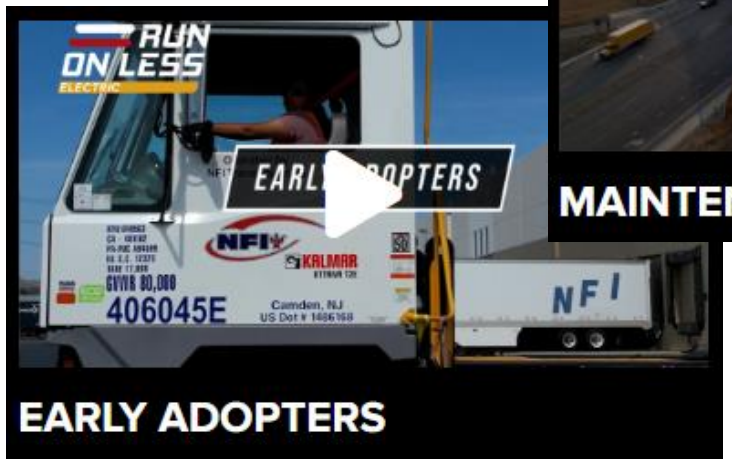
CHARGING INFRASTRUCTURE

DRIVERS LOVE ELECTRIC

RANGE & WEIGHT ANXIETY



MAINTENANCE & UPTIME



EARLY ADOPTERS

"Stories from the Road"

- New video every day
- All commercial truck EV related
- Pulled from several dozen interviews

RUN ON LESS ELECTRIC

Specs: Anheuser-Busch

Truck

Truck Class	Class 8
Type	Heavy-Duty Tractor
OEM	BYD
Model	8TT Tandem Axle
Production Level	In Series Production
Battery Capacity	435 kWh
Estimated Range	150 - 200 Miles
Components	Cabover

Charger & Utility Company

Charging Station

Max Charge Rate	40 kW (GB/T)
Parking Configuration	Pull in with Trailer
Utility	Southern California Edison

Driver

Driver

Name	Rene Solis
Years Driving	30 Years
Home Base	Pomona, CA

Duty Cycle

Route

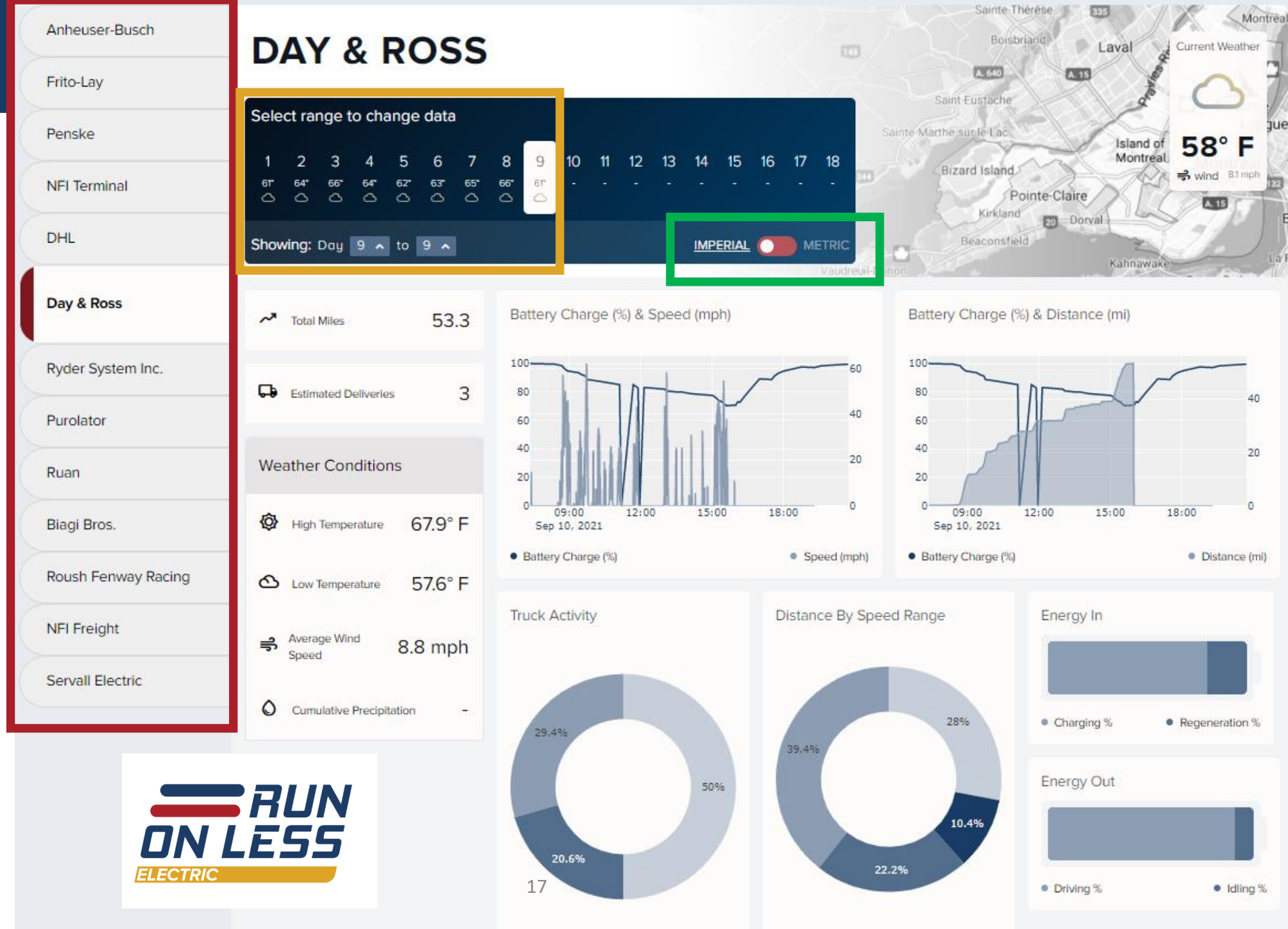
Route Type	Diminishing Load (7-10 stops per day)
Goods	Beer and Seltzer
Payload Range	Usually heavy, up to 82,000 lbs

Truck

RUN ON LESS ELECTRIC

Metrics

1. Select any of the 13 fleets
2. Select a day or range of days
3. Select Units of Measure
4. Enjoy the data!



RUN ON LESS ELECTRIC

Preliminary Findings

- Early adopters of electric vehicles (EVs) are validating an acceptable total cost of ownership in urban medium-duty vans and trucks, terminal tractors and short regional haul applications.
- EV adoption is occurring throughout North America, but for longer haul heavy-duty semi-trucks use has been somewhat limited to California.
- There are benefits to EVs (quiet operation and reliability) as well as challenges (infrastructure and range).
- EV truck ecosystem inertia is in its early stages with many solutions emerging that will support adoption in the next several years.
- The industry needs to develop standards in the areas of charging, repair, maintenance and training.

Preliminary Findings

- There is a huge demand for real-world information on EVs in commercial applications and on charging infrastructure.
- The mix of startups and traditional truck OEMs and component manufacturers is expediting the development of creative and practical solutions.
- More thought is needed on the best way to gather and manage the necessary data for fleets and manufacturers to measure and monitor their EVs.
- Early adopters of EVs are having an influence on improving trucks and infrastructure.
- EVs present operational challenges, for example longer charging times than fueling, which these fleets are working to mitigate.

Electric Truck Bootcamp

ELECTRIC TRUCK BOOTCAMP

SESSION

1. Why Electric Trucks?
2. Charging 101 — Planning & Buildout
3. Charging 201 — Power Management & Resilience
4. Working with Your Utility
5. Incentives for Electrification
6. Maintenance, Training & Safety
7. Finance & Innovative Business Models
8. Battery Supply Chains & End of Life
9. Global Perspectives
10. Drivers & Electric Trucks

RUN ON LESS ELECTRIC

SCAN for Training Videos, Quizzes and Badges

WWW.RUNONLESS.COM

Building CBEV Insights

- Bootcamp
- Profiles
- Metrics
- Events
- Post-Run Reports
  - ❑ 4 EV Segments
  - ❑ Detailed main report
  - ❑ Charging Systems

Fleet Electrification Waves

Electrification waves drive Run On Less - Electric scope

1. Forklifts
2. ***Yard Tractors***
3. ***MD Urban Delivery***
4. ***Drayage***
5. ***Regional Haul Tractors***
6. Long Haul Tractors

MD & HD Industry Segments

Market Size

MD Delivery (Box trucks & step vans)
Total Population: **1,900,000**
Miles: **125/day 25K/year**

Regional Haul (Day cabs & some sleepers)
Total Population: **800,000**
Miles: **450/day 80K/year**

Long Haul (Sleeper Tractors)
Total Population: **1,200,000**
Miles: **600**/day **100K**/year

School Bus (yellow or white)
Total Population: **480,000**
Miles: **??**/day **12K**/year

MD Work Trucks (Dump, stake, service, waste…)
Total Population: **470,000**
Miles: **125/day 25K/year**

Vocational Class 8
(Construction, waste, dump…)
Total Population: **800,000**
Miles: **300/day 65K/year**

Transit Bus (public transportation)
Total Population: **150,000**
Miles: **??**/day **35K**/year

Yard Tractors (holsers, shuttles…)
Total Population: **35,000**
Miles: **10-20**/day @ 10 MPH

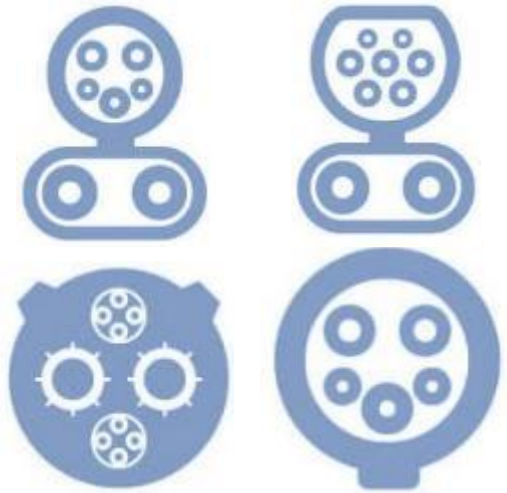
Expeditors Class 5-8
(MD & HD rush deliveries…)
Total Population: **25,000**
Miles: **500/day 90K/year**

This slide is under development

Electrification Time Frame

EVSE: Electric Vehicle Supply Equip.

- Size
- Location
- Connector(s)
- Interoperability (OCPP = Open Charge Point Protocol)
- Support
- Software for charge management
- Utility Interface
- TOU: Time of Use charges



Pathways to HD Truck Charging

1) Fleet Depot Based

2) Opportunity Charging
Stores, Ports, Warehouses…

3) Shared Card Lock Locations

4) Truck Stops

5) Toll Road Rest Areas

6) Interstate Rest Areas

7) **Mobile Roadside Charging** (emergencies & service calls)
8) **In Motion Charging**

Electric Trucks

Collaboration

- Fleets
- OEMs (Existing ***& New***)
- Suppliers
- Dealerships (Sales/Service)
- Governments
- ***Charging System Suppliers***
- ***Utility Companies***

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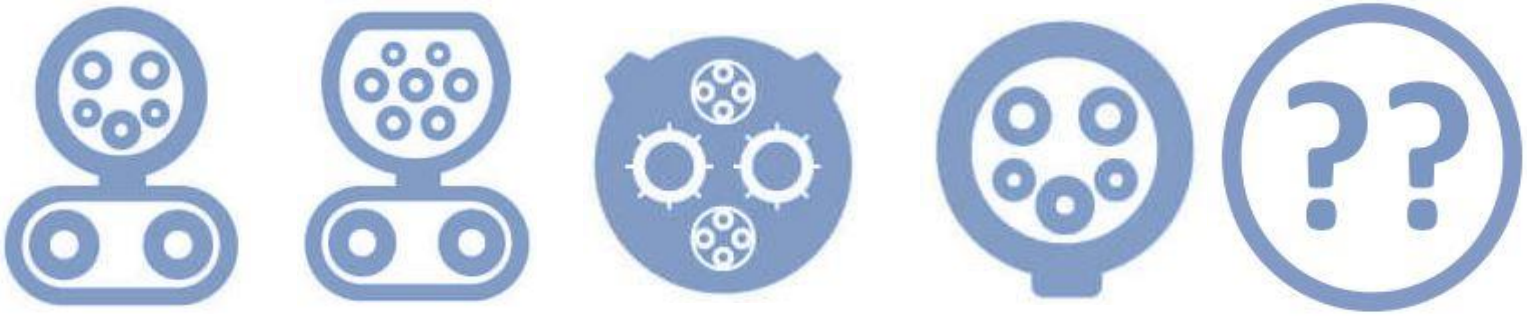

Let's Stay Connected… … And charged up!

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